

⑨ Given:

$$\frac{dA}{dt} = 4 \text{ cm}^2/\text{min}$$

$$h = 20 \text{ cm}$$

$$\frac{db}{dt} = 1 \text{ cm}/\text{min}$$

$$A = 80 \text{ cm}^2$$

$$\frac{dh}{dt} = ?$$

$$\text{Find } b: * 80 = \frac{1}{2} b(20)$$

$$80 = 10b$$

$$8 \text{ cm} = b$$

$$A = \frac{1}{2} b h$$

$$\frac{dA}{dt} = \frac{1}{2} b \frac{dh}{dt} + \frac{1}{2} \frac{db}{dt} h$$

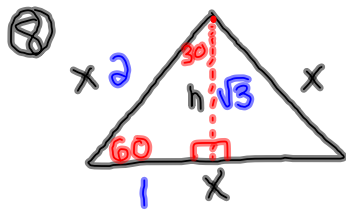
$$4 = \frac{1}{2}(8) \frac{dh}{dt} + \frac{1}{2}(1)(20)$$

$$4 = 4 \frac{dh}{dt} + 10$$

$$-6 = 4 \frac{dh}{dt}$$

\therefore The height is decreasing at a rate of 1.5 cm/min

$$\boxed{-1.5 \text{ cm}/\text{min} = \frac{dh}{dt}}$$



$$\frac{x}{h} = \frac{2}{\sqrt{3}} \quad \leftarrow \text{Rearrange for } h$$

$$2h = \sqrt{3}x$$

$$h = \frac{\sqrt{3}x}{2}$$

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}x \left(\frac{\sqrt{3}x}{2} \right)$$

$$A = \frac{\sqrt{3}x^2}{4}$$

$$\frac{dA}{dt} = \frac{\sqrt{3}x}{2} \frac{dx}{dt}$$

$$\frac{dA}{dt} = \frac{\sqrt{3}(15.19)(-2)}{2}$$

$$\boxed{\frac{dA}{dt} = -26.3 \text{ cm}^2/\text{s}}$$

$$\text{Let } b = x$$

Given:

$$\frac{dx}{dt} = \underline{-2 \text{ cm/s}}$$

$$\frac{dA}{dt} = ?$$

$$A = 100 \text{ cm}^2$$

Find x:

$$A = \frac{\sqrt{3}x^2}{4}$$

$$100 = \frac{\sqrt{3}x^2}{4}$$

$$\sqrt{3}x^2 = 400$$

$$x^2 = 230.9$$

$$x = \underline{15.19 \text{ cm}}$$

∴ The area is decreasing at a rate of $26.3 \text{ cm}^2/\text{s}$.